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Environmental Affective Dispositions Scale (EADS): The Study of Validity and Reliability and Adaptation to Turkish

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ABSTRACT

The aim of this study is to conduct a research under circumstances of Turkey about the validity and reliability of the Affective Tendencies towards Environmental Scale prepared by Yavetz, Goldman and Pe'er (2009). The translation of this scale to Turkish was done by the researchers and language specialists. And then, the scale was evaluated by the specialists in terms of relevance to Turkish content, measurement- evaluation. This scale on which some arrangements were made was applied to 521 fourth grade preservice science teachers studying in the state universities in Turkey to determine the validity and reliability. The findings related to the structure validity of the scale were provided by exploratory factor analysis method. Also, exploratory factor analysis was followed by the confirmatory factor analysis applied to the obtained structure. This scale is formed into four sub dimensions. The scale prepared by the 5-point Likert format containing 23 items. Cronbach Alpha reliability scale was found as 0.84; and found as 0.77 for Environmental Affective Tendency; it was 0.62 for Intention to act; 0.66 for prevention of damage to the environment and it was 65 for personal responsibilities.

KEYWORDS
Teacher education, environmental education, environmental literacy

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Introduction

Turkey, generally, is one of the developing countries. For this reason, Turkey's population has increased continuously in recent years and it has a growing structure based on the mass consumption, economic and industrial development. Consequently, Turkey comes up against the big changes regarding the sustainable development and the environmental education which is the primary instrument for the sustainable development. In this respect, objectives about the environmental education has been added to science curriculum firstly

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with the changes made in 2005 and then in 2013 (Erdoğan, Kostava & Marcinkowski, 2009; Ministry of Education [ME], 2013). This programme considering its environmental dimensions shows a different structure from the previous science curriculum. One of the main objectives of this programme is to develop the environmental literacy of the individuals (Erdoğan, 2007).

When the studies made in the context of environmental education on the basis of teacher training institutions, it is seen that the studies are in limited numbers and these studies have gathered under two dimensions. The studies in the first dimension emphasise that to unite the university education under a single course has a restricted effect on the development of students' environmental literacy (Hsu, 2004; Brody & Ryu, 2006; Ryu & Brody, 2006). In the studies of the second dimension, it is observed that it is aimed to develop or adopt a scale to assess the students' environmental literacy improvement (Roth, 1992). However, when the related literature has been investigated, it has been determined that there is scarcely any study that determines the pre-service teachers' level of environmental literacy in Turkey. One of the most important reason for this is that there is not any measurement instrument that can be used in the field of environmental literacy. By considering this, it is aimed to make a study that determines the validity and reliability of the scale that has been developed by Yavetz, Goldman and Pe'er (2009) in Turkey and that targets at the affective disposition dimension of the environmental literacy. It is informed that using the scales out of the language that they have been developed and adapted from will extend the research data, will be used in the comperative researches between the culture-language and ethical groups (Şahin 1994; Savaşır, 1994). It is expected in this study that regarding the pre-service students' environmental literacy, to adapt this scale into Turkish and to reach the data of the environmental education in Turkey by using it in other researches will highly contribute into the field.

Environmental Literacy

Environmental literacy that has been used more commonly in recent years in Turkey is generally defined as "a functional education that is given to all people to provide environmental knowledge, skill and motivation to contribute to the sustainable development" (Erdoğan, Kostava & Marcinkowski, 2009). In this context, the environmental literacy can be defined as "functional literacy" in the concerning field (UNESCO, 1989). On the other hand, according to Roth (1992), environmental literacy is the capacity of the individual to show his environmental knowledge as behaviour. After Roth's definition, definitions made about the environmental literacy emphasise the environmental behaviours, and it is stated that the environmental literacy is the skill in transforming environmental knowledge into responsible behaviours about the environment (Morrone, Mancl & Carr, 2001). Disinger and Roth (1992) have stated that an individual, along with an extent environmental knowledge, should be able to use responsible environmental behaviour, belief, view and attitudes in determination and prevention of the environmental problems.

When the studies made for the understanding of the environmental literacy have been analysed, it is observed that there are some factors to take into account in providing an individual with the environmental literacy. As it is seen in definitions, these factors focus on awareness, knowledge, skill and behaviour. These factors are important elements to take into consideration during actions

made or to be made about providing or developing environmental literacy. As deficiency of one of these factors will cause literacy skill not to develop completely and will prevent the individual to be assessed as an environmentally literate indvidual (Kışoğlu, 2009). When the related literature has been investigated in directions of the importance of this subject, it is possible to come across with many studies reseacrhing about the dimensions of environmental literacy (Hsu & Roth, 1999; Hungerford & Peyton, 1976; Marcinkowski, 1991; Roth, 1992). Factors mentioned have been analysed and defined in detail. The first study in this subject was made by Hungerford and Peyton (1976). According to Hungerford and Peyton (1976), an environmentally literate individual should have the qualities of 1) cognitive knowledge 2) cognitive skill and 3) affect. However, in the following days, it has been focused on the necessity of the dimension of behaviour as a part of the environmental literacy and the dimension of behaviour has been added into these components (Roth, 1992; Stables, 1998). On the other hand, in parallel with the constantly changing environmental problems, it has been revealed that there should be improvements in onservable components of environmental literacy, because there are clear differences between the environmental problems available in 1900s and those in the 21st century (Teksöz, Şahin & Oztekin, 2012).

In this context, the researchers taking part in the environmental literacy evaluation consortium (H. Hungerford, T. Volk, R. Wilke, R. Champeau, T. Marcinkowski, B. Bluhm and R.McKeown-Ice) has determined the factors of the environmental literacy by taking the definitions of environmental literacy in history into consideration (Erdoğan, 2009). According to the codecision made by the researchers, the components of the environmental literacy are composed of four dimensions; (1) knowledge, (2) affect, (3) skill and (4) behaviour (Hsu, 2004; Roth, 1992).

The element of knowledge that is the first item of the environmental literacy is not limited to only the ecology knowledge. Along with the knowledge of ecology, to know the definitions of the important environmental terms, to grasp the environmental events and the relationship between these events and the natural systems are the subdimensions taking place in the conponent of knowledge of environmental literacy.

The second item taking place in the environmental literacy skill is the component of skill. The component of skill is to use the environmental knowledge and attitude in solving an environmental problem by the individual. When the subskills of the mentioned skills are analysed, it is observed that these skills are the skills of psychomotor, communication and high thinking.

One of the example of the use of skill is to assort the plastics in order to recycle them. During this process, the individual uses his psychomotor skill. On the other hand, working with the other individuals for the solution of a problem and to share the knowledge about the environment in a social environment can be given as an example to the communication skill. Moreover, defining, evaluating and analysing an environmental problem can be given as an example to skill of high thinking (Kışoğlu, 2009).

The third component of the environmental literacy is the behaviour. The third item of the environmental literacy is the behaviour. The component of behaviour is a concrete indicator of the individual's environmental knowledge, attitude and skill and also it signifies the active participation in the activities that will contribute in solving the environmental problem.

The last component of the environmental literacy skill is the affective dispositions. Disposition; it is defined as the state of having a tendency to do something (Oxford English Dictionary, 1989). In this regard, affective dispositions can be defined as affective reactions that individuals display towards environmental deterioration (Hines, Hungerford, & Tomera, 1987; Kals & Maes, 2002; Kollmuss & Agyeman, 2002). In other words, affective tendencies are the state of the individual to be sensitive both to the environment and the environmental problems and to take moral and ethical values of the society into consideration while making decisions about the environment and showing responsibities towards the environment (Roth, 1992). this disposition has a significant importance in the requirement to take action for environmental literacy (Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011). That is, the concept of affective dispositions plays a crucial role in development of environmental responsibilities of individuals. If they have acquired negative attitudes towards the environmental issues, it is less likely for them to take part in environmental actions (Liu & Lin, 2015).

The component of affective disposition includes subdimensions in itself (Roth, 1992). These are personal responsibility and self-control. Self-control is defined as the skills that the individuals who cause environmental differences through individual behaviours perceive in themselves. In this sense, self-control has been explained as external and internal self-control. External self-control is defined as the effect made in order to change the external factors. A personal behaviour is out of question in the external factor; so, the individual is less inclined to affect this situation. Internal self-control, on the other hand, is the perception of the individual about the changes s/he can make through personal effects and perception about his/her own skills (Hungerfold, Volk & Ramsey, 1990).

With this regard, the aspects such as intention to take action, sensitivity towards the environment, eagerness, attitude, world-view, self-efficiency, self-control and motivation are defined as variables involved in affective dispositions (Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011; Erdoğan, 2009).

Intention to Take Action: Intention is related to affective component of attitude (Fishbein & Ajzen, 1975, p.289). "Intention to take action," on the other hand, suggests the relationship between behavioral intention and decision making process (Hadjichambis, 2015). With this regard, the aspect of intention available in environmental literacy can be explained as verbal decision making process about environmental actions of individuals. That aspect of intention to take action is one which has especially been added by Hines et al. (1986/1987) to components of environmental literacy with his modelling study. In the following periods, this aspect was also used in the environmental literacy model by Hungerford and Volk (1980). This ability is one of the factors enabling positive attitudes towards environmental issues. Studies have revealed that individuals who have high intention to take action are more likely to have positive environmental attitudes more frequently than others (Bogner & Wiseman, 1997; Cottrell & Graefe, 1997)

Environmental Sensitivity: Although it is hard to define and measure the aspect of environmental sensitivity, since the early practices of environmental education (UNESCO, 1978), it has been accepted to be one of the abilities aimed in environmental education. In early studies of this field (Peterson, 1982; Tanner, 1980), envirronmental sensitivity is an aspect which is related to the processes of

caring for, appreciating and investigating about the environment. Related studies have shown that life experiences form one of the most important factor affecting environmental sensitivity (Peterson, 1982; Tanner, 1980).

Focus of control: This factor may be viewed as an output which is also defined as the reflection of inherent focus of control which is promising at revealing the individual's personal behavior (Rotter 1966). When the literature in this field is reviewed, it is observed that there is a strong connection between the development of positive environmental behaviors and the tendency of focus of control. (Hwang, Kim, & Jeng 2000; McCarty & Shrum 2001).

Personal Responsibility: Personal responsibility may be explained as the individual's recognizing the proper environmental behaviors. This kind of tendency is about meta-cognitive processes. Individuals who hold personal environmental responsibilities use these skills to reduce negative behaviors harrmful to the eenvironment. (Bamberg & Moser, 2007).

Environmental Values: This factor may be viewed as a criterion the individuals use to choose what the proper environmental behaviors are, and to decide whether the existing environmental behaviors are proper or not. Each individual has a special values structure. The way those individuals learn and their experiences shape their values structure (Kahle, 1996). For instance, an individual willing to show his respect to the environment may prefer buying ecological products, using recyclable goods or taking part in environmental activities for a better protection of it (Martinez, 2006).

Interest: This is a state including the individual's desire to investigate the relationship between tthe environment and human being, and to learn about the topics related to environment (Erdoğan, 2009). According to the studies in this field, individuals who develop a curiosity in environmental issues are more likely to have more responsible environmental behaviors (Dresner & Gill, 1994) and positive interest in and attitudes towards environment (Harty et al. (1984, as cited in Lawson et al, 1984).

Attitudes Towards Environment: Attitudes towards environment are, in general, positive or negative feelings towards the environmental events and their significant effects (Hines et al., 1986/87). When related literature is reviewed, it is observed that some studies which investigate the relationship between attitudes and responsible environmental behaviors propose that attitudes lead to behavioral changes, while some state that attitudes have no effect on behavioral changes. To sum up, although the relationship between attitudes and behaviors is not defined clearly, attitude is accepted to be one important aspect for environmental literacy.

Of the affective dispositions, there are fed by different points. For example, like the environmental sensitivity (Chawla, 1998; Sward & Marcinkowski, 2001), some significant dispositions focus mainly on natural world, while attitudes towards and interest in environment focus on environmental problems. Some dispositions like personal responsibilities, self-efficiency and intentions (Hines et al., 1986/87; Bandura, 1977), on the other hand, focus on problem solving behavior. These statements clearly show that different experiences and practices are needed in order to strenghten affective dispositions. These dispositions have an active role in the processes of problem solving and decision making. In other words, individuals' affective dispositions are viewed to be strong motivation for them to display environmental behaviors (Liu & Lin, 2015). Therefore, in order to

help each disposition, improve, it is very important to establish the most suitable contexts and to do the required evaluations.

Evaluation of Educational Literacy

When the studies on evaluation of educational literacy are considered, they are observed to focus, in parallel with environmental definitions, mainly on environmental attitudes and information in the early years. In the following years, big-scaled measuring instruments including the aspect of behavior were developed. Especially at the beginning of the 21st century, it is very possible to come across many studies focusing on the evaluation of environmental literacy of individuals (Teksöz, Şahin, Öztekin, 2012). This environmental movement which first started in Korea was also seen in Israel and Turkey in later years. It started to be observed in Taiwan in recent years (Erdoğan, Marcinkowski, 2015).

Evaluation of The Aspect of Affective Disposition

When studies about the sub-aspect of affective dispositions are considered in Turkey, they are clearly seen to be on the aspects of attitude (Atasoy & Ertürk, 2008; Benzer & Şahin, 2012; Kunt &Geçgel, 2013; Taşkın, 2005; Sadık & Sarı, 2010; Sever & Yalçınkaya, 2012; Uluçınar Sağır, Aslan &Cansaran, 2008; Uzun, Atlı & Sağlam, 2010), awareness (Benzer & Şahin, 2012), consciousness (Erkal, Şafak & Yertutan, 2011; Şimşekli, 2004; Uzun & Sağlam, 2005), perception (Ozdemir & Uzun, 2006;) and sensitivity (Benzer & Şahin, 2012; Kaya & Turan, 2005; Sahin & Gül, 2009). According to this investigation, it is seen that the studies conducted in relation with the sub-aspect of affective dispositions mainly deal with attitude, sensitivity and consciousness, and that the number of studies dealing with other aspects such as awareness and intention to take action is quite few. Assessment and evaluation are very important steps for the development of a skill. It is noticed in the processes of assessment and evaluation whether a related skill has developed or if it has, to what extent the development is. In order to help the processes of assessment and evaluation be more effective, there is a need for valid and reliable measuring instruments. If the instruments are for the aimed skill, it is easy to observe the development of that skill. Because the number of affective dispositions studies on skills such as sensitivity, awareness and intention to take action are quite few, it is really difficult to watch the improvement of these skills. Therefore, it is believed that the adaptation or development of new measuring instruments will contribute to this field. With this regard, in this study, in order to conduct the study of validity aand reliability in Turkey, it is aimed to use the scale of Yavetz, Goldman & Pe'er (2009) focusing mainly on affective dispositions of environmental literacy. It is reported that the use of scales in other languages with the improvements and their adaptation will contribute to the generation of information as this process enables the possibility of increasing the amount of data, and of their use in studies by groups of different cultures and countries (Sahin 1994 ; Savaşır, 1994). It is expected in this study that the use of this scale in Turkey by the novice teachers to determine the affective dispositions, and so to gather information about environmental education in Turkey will contribute to the field.

Method

Sample of the Research

The research has been carried out with 521 pre-service teachers who are studying in the fourth grade of state universities in Turkey in the 2010-2011 spring term and who have been selected through stratified sampling method (Karasar, 2006). All of the universities in all regions have been classified according to the region in order to determine the number of the sampling. At the end of the classification, total number of the fourth grade pre-service teachers in all regions has been found. Representation percentage of the population by the universities in the region has been calculated through population of the region. Sampling about the percentage has been taken from the university. Distribution of the universities by the areas, total number of 4th grade pre-service teachers by the areas, total number of 4th grade pre-service teachers in the universities, representation percentage of the local population by the universities and number of the sampling taken from the universities according to the determined percentage have been shown in Table 1.

Process

In the practice of the adaptation of the scale from the other languages, it is very important to make the statements relevant to the target language and the culture. (Çetin, Doğan & Sapmaz, 2010). With this regard, in the process of adaptation of affective dispositions scale from English to Turkish, investigators followed the steps below:

1. The first translation from language professionals. The items available in the scale of affective dispositions were translated into Turkish by two professionals who mastered both Turkish and English literature, and by a professional translator. The translators did the translation independent from each other. During the translation, social, educational, ecological and cultural qualities of Turkey were taken into account. Two investigators from environmental education evaluated the scale in order to eliminate the possible vagueness in items and foreign terms, and to adapt it to Turkey conditions. With this regard, the item 22 in the scale was redesigned. In the original scale, the item is "the construction of the marines by the sea should be stopped," while it has been changed into "the construction of hotels or summer houses by the sea should be stopped." The reason is that the constructions by the sea are mainly hotels and summer houses. In another step, the available translations were analized by a researcher and another translator, and the most accurate items with Turkish expressions have been determined. In order to strenghthen the reliability of it, the scale which was translated into Turkish has been retranslated into English by a researcher who didn't see the scale before. It was aimed to see how relevant those two versions are to each other. The high relevance of those two proved that the scale which was translated into Turkish was suitable to conduct (Dindar & Geban, 2015).
2. Arrangement of the items. In this step, the translated and the original scales were analized by the researchers. They wanted to see whether there are expressions possible to lead to a misunderstanding. The goal in this step is to increase the reliability of this scale. Interpretation of the items in the scale by all the students in the same way increases its reliability.

Table 1. Samples by universities and Universities by Region in Turkey in 2011

Region	City by region	University	Major	%	Sample
MEDITERRANEAN	Adana	Çukurova	31	30,1	10
	Burdur	Mehmet Akif	41	39,8	16
	Mersin	Mersin	31	30,1	10
	Total Sample				36
EAST	Kars	Kafkas	82	18,18	15
	Elazığ	Fırat	82	18,18	15
	Erzincan	Erzincan	82	18,18	15
	Erzurum	Atatürk	82	18,18	15
	Malatya	İnönü	82	18,18	15
	Van	Yüzüncü Yıl	41	9,09	4
	Total Sample				79
AEGEAN	Denizli	Pamukkale	103	29,5	31
	İzmir	Dokuz Eylül	103	29,5	31
	Manisa	Celal Bayar	62	17,71	11
	Muğla	Muğla	82	23,4	20
	Total Sample				93
SOUTH EAST	Adıyaman	Adıyaman	31	33,3	11
	Diyarbakır	Dicle	31	33,3	11
	Siirt	Siirt	31	33,3	11
	Total Sample				33
CENTRAL ANATOLIA	Ankara	Gazi	166	20,6	35
	Ankara	Hacettepe	80	9,95	8
	Ankara	ODTÜ	52	6,46	4
	Eskişehir	Osman Gazi	41	5,10	2
	Kayseri	Erciyes	104	12,93	14
	Kırıkkale	Kırıkkale	41	5,10	2
	Kırşehir	Ahi Evran	124	15,42	20
	Konya	Selçuk	124	15,42	20
	Niğde	Niğde	31	3,85	1
	Sivas	Cumhuriyet	41	5,10	2
	Total Sample				108
MARMARA	Balıkesir	Balıkesir	62	12,06	8
	Çanakkale	On Sekiz Mart	82	15,95	14
	Edirne	Trakya	41	7,97	4
	İstanbul	Marmara	62	12,06	8
	İstanbul	Boğaziçi	31	6,03	2
	İstanbul	İstanbul	41	7,97	4
	Kocaeli	Kocaeli	82	15,95	14
	Sakarya	Sakarya	72	14,01	11
	Bursa	Uludağ	41	7,97	4
	Total Sample				69
BLACK SEA	Amasya	Amasya	123	19,93	25
	Giresun	Giresun	31	5,02	2
	Bolu	Abant İzzet Baysal	72	11,66	9
	Kastamonu	Kastamonu	82	13,29	11
	Samsun	On Dokuz Mayıs	103	16,69	18
	Sinop	Sinop	31	5,02	2
	Tokat	Gazi Osman Paşa	31	5,02	2
	Trabzon	Karadeniz Teknik	144	23,33	34
	Total Sample				83
	Total		2932		521

3. Pre-application. This study was conducted to 10 4th grade novice Science teachers. The aim is to determine the amount of time needed to give answers to the questions in the scale, and to see whether there is vagueness with the items. With this regard, last corrections were made and it was seen that it took 10 minutes to conduct the scale. So, the inner validity of the scale was maintained.
4. Last correction. Language suitability of the scale was checked after the analysis of inner validity. In this stage, the original English form of the scale and its Turkish translated form were conducted to 30 4th grade novice English teachers who were studying at Gazi University. In order to analyze the data, arithmetic mean of both the English and Turkish forms of the scale was considered and correlation measuring and t-test were conducted (Şeker & Gençdoğan, 2006). It was seen that the correlation between the answers of the novice teachers to both forms of the scale was .954. Büyüköztürk, Böke and Köklü (2008) state that the correlation is high if it is between 0.70 and 1.00. Because the data gathered showed that consistency of the two forms of the scale was high, and it was ready to be conducted.
5. Data collection. With the scale prepared, the study was conducted to 521 novice Science teachers studying at state universities in Turkey. Because there were 23 items in the scale and at least 10 students were needed for each, it was seen that the number of the samples of the study was adequate (Field, 2000).

Data analysis. In order to maintain the structure validity of the scale in the study, the factor analysis AFA and DFA were done. Item-total correlation tests and 27% comparison of bottom-up groups were conducted in order to determine the distinctiveness of the items in the scale. To determine the reliability of the scale, the most-applied method Cronbach Alpha value (Bagner, Storch & Roberti, 2004) was measured.

Data Collection Tools

Environmental affective dispositions scale (EADS) was developed by Yavetz, Goldman and Pe'er (2009). The original scale was arranged with the type of likert scale of 5. These were defined as (1) Strongly disagree (2) Disagree (3) I cannot decide (4) Agree (5) Strongly agree. The scale consists of 23 items. 5 of these items are negative, while the rest 18 are positive. The highest degree to get from the scale is 115, whereas the lowest is 23. The scale was conducted to 214 novice teachers studying at teachers' high school in Israel. The original scale consists of 5 sub-groups such as the importance of environmental instruction in educational system, priorities for the policy of management of national sources, the use of legislation for environmental issues, self-control and care for the environment. For the practice of the validity and the reliability of the scale, items were determining in accordance with these sub-groups. Following this procedure, Cronbach alpha reliability value was considered for each sub-group and the entire scale. According to the data gathered, the value for the importance of the environmental instruction in educational system was .73; .67 for the priorities for the policy of management of national sources; .52 for the use of legislation for environmental issues; .59 for self-control; .67 was the value for care for the environment, and it was .81 for the entire scale. During the scale's development

process, exploratory and corroborative factor analysis weren't needed (Peer, Goldman &Yavetz, 2007).

Findings

Surface Validity

Before the adaptation of the scale of affective dispositions, the designer of the original scale, Bela Yavetz was asked for permission to use it. It was translated into Turkish without any difference from the original form. Social, educational, ecological and cultural qualities of Turkey were considered during the process of its translation. With this regard, the scale was investigated in accordance with its suitability to our language, whether the sentences used were clear and accurate enough to understand. For this, both the original and the translated scales were compared and contrasted by professionals.

Construct Validity

Factor analysis is to reach a factor through the classification of the variables which are interrelated and measure the same dimension and through calculating the correlation between the variables according to the answers give by the subject about a matter (Ural & Kılıç, 2005). Factor analysis is both used in testing the integrity of the scale and help to clear the related subject from the unrelated variables (Henson & Roberts, 2006). The objective in the factor analysis is to express many items with "factors" in less number (Karasar, 2006).

Exploratory Factor Analysis (EFA)

Exploratory factor analysis has been made in order to reveal the covert structure of the affective disposition towards environment scale. First of all, KMO (Kaiser-Meyer-Olkin) value and Barlett's test (Bartlett's Test of Sphericity) have been calculated to decide whether the factor analysis should be made for the measurement instrument or not. In the data collected, suitability of the data for the sampling group has ben calculated as Kaiser-Meyer-Olkin (KMO)=0.85 on the level of 0.000 and the result of the Barlett's Test has been found as $\chi 2$= 2663.600 as a result of the application of measurement instrument. KMO value is suggested to be at least 0.60 in order to make factor analysis on the data (Pallant, 2001). In this context, it can be said that the data are suitable for the factor analysis.

In the following stage, principal components analysis and varimax technique have been used for the item analysis of the affective dispositions scale. It has been determined that factor load disperses on more than one factor in the five-item structure and variance percentage of the subfactors have the value close to each other. For this reason, extracting has been made through the principal component analysis and varimax technique by decreasing the factor structure of the scale to 4 (Karasar, 2006). In the survey, the items whose factor load is at least 0.40 and more have been accepted and item extraction has not been made. Line chart regarding the eigenvalue of factor about the new structure is presented in Figure 1.

In the line graphic of the factor Eigen values in Figure 1, the point of fall of the graphic curve is the point of the 4th factor. For this reason, the factor number in the survey is accepted as 4. Results about the factor loads are given in Table 2.

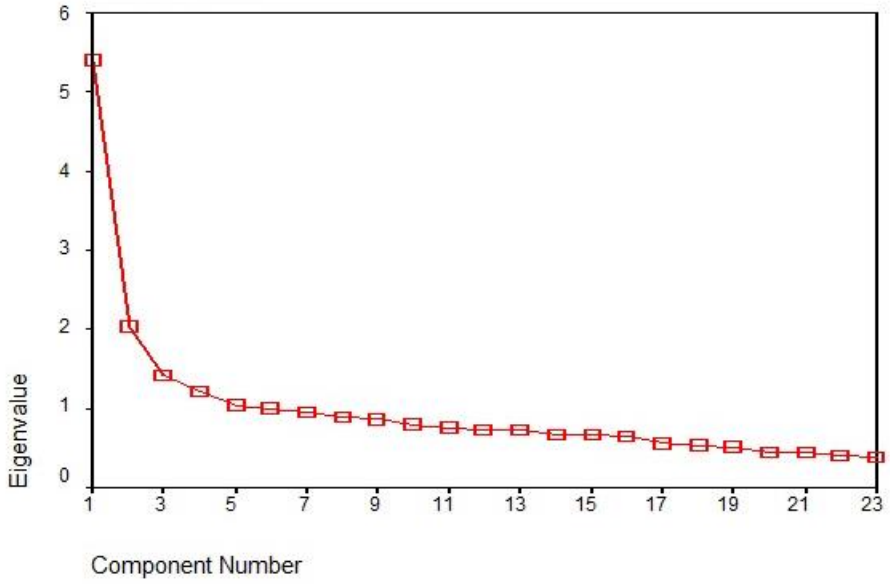

Figure 1. Please add the figure legend

Table 2. Factors and Factor Loads Achieved as a results of the Second Principal Components Analysis of the Affective Dispositions Toward Environment Scale

	Rotated Component Matrix Component			
	1	2	3	4
Item 21	.673			
Item 14	.646			
Item 13	.612			
Item 22	.569			
Item 17	.557			
Item 19	.545			
Item 1	.480			
Item 11	.422			
Item 4		.676		
Item 3		.650		
Item 10		.530		
Item 9		.495		
Item 16		.463		
Item 18		.453		
Item 2			.643	
Item 23			.626	
Item 12			.595	
Item 20			.556	
Item 15			.499	
Item 7				.758
Item 8				.661
Item 5				.595
Item 6				.587

Eigen values of four factors stated, variance percentages and total variance percentages are shown in the Table 3. As can be seen in the Table 3, Eigen values of four factors are over 1.

Table 3. Scale Factor Structure

Factor	Total	% of Variance	Cumulative %
1	5.408	13.510	13.510
2	2.022	10.619	24.128
3	1.401	10.002	34.131
4	1.214	9.546	43.676

As it is seen in the Table 3, the first factor of the affective dispositions toward environment scale with 4 factors explains 13.510 %, the second factor 10.619 %; the third factor 10.002 % and the fourth factor 9.546 % of the total variance. Total variance explained by four factors is 43 %.

Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis based on the structural equation model has been made to confirm the four-factor structure of the affective dispositions toward environment scale which has been translated into Turkish. Confirmatory factor analysis is made to test the suitability of the factorial structure coming into being as a result of the exploratory factor analysis. It is observed that many fit indices are used in the related literature within the scope of this test (Gizir, 2005). Although it is not clear about which fit indices will be based on for the model suitability (Şimşek, 2006), when the mostly used fit indices have been analysed, it is seen that these are goodness of fit index-, GFI, adjusted goodness of fit index-AGFI, comparative fit index-CFI, Root mean square residual-RMR, Standardized SRMR and Root mean square error of approximation-RMSEA, normed fitness index-NFI (Kayri, 2009). On the other hand, the first fitness statistics that was used in history is chi/x square. It is necessary for the chi square value to be unmeaningful for a model to be acceptable. Chi square statistics look at the correspondence of the universe covariance matrix with the sampling covariance matrix. So if the value in question is meaningful, then two covariance matrix are different from each other (Tabachnick & Fidell, 2001). Generally, in all of the lisrell applications, chi square value is meaningful. For this reason, the model is tested with another calculation in which chi square value is divided to degree of freedom ($\chi 2/fd$). Acceptable fit value for $\chi 2/fd$ is $2 < \chi 2/sd < 5$ and perfect fit value is accepted as $0.00 < \chi 2/sd < 2$. When the acceptable fit values for the index have been analysed, $0.05<X<0.08$ values in RMSEA, SRMR, RMR have accepted; $.90<X<0.95$ values have been accepted in GFI and CFI; in AGFI value $0.85<AGFI<0.90$ values have been accepted. In the RMSEA, SRMR, RMR values, $0.00<X<0.05$ has been accepted as perfect fit value, in AGFI value $0.90<AGFI<1.00$ values have been accepted as perfect fit value (Jöreskog & Sörbom, 2001; Mcdonald & Moon-Ho, 2002; Tabachnick &Fidell, 2001). In the Confirmatory Factor Analysis, the fit indices of the model have been analysed and chi square statistic has been calculated as $X^2_{(224)} = 584.45$ $p<0.01$. In this context, $\chi 2/sd$ rate has been determined as 2.61; root mean square error of approximation

(RMSEA) has been found as (RMSEA)= 0.056; standardized root mean square residual (SRMR)= 0.059; goodness of fit index (GFI)= 0.91; adjusted goodness of fit index (AGFI)= 0.89; comparative fitness index has been found as (CFI)= 0.94. The results obtained reveal that although the model suggested has not the perfect fit values, it is in the acceptable limits. Parameter estimations regarding the model have been shown in the Figure 2.

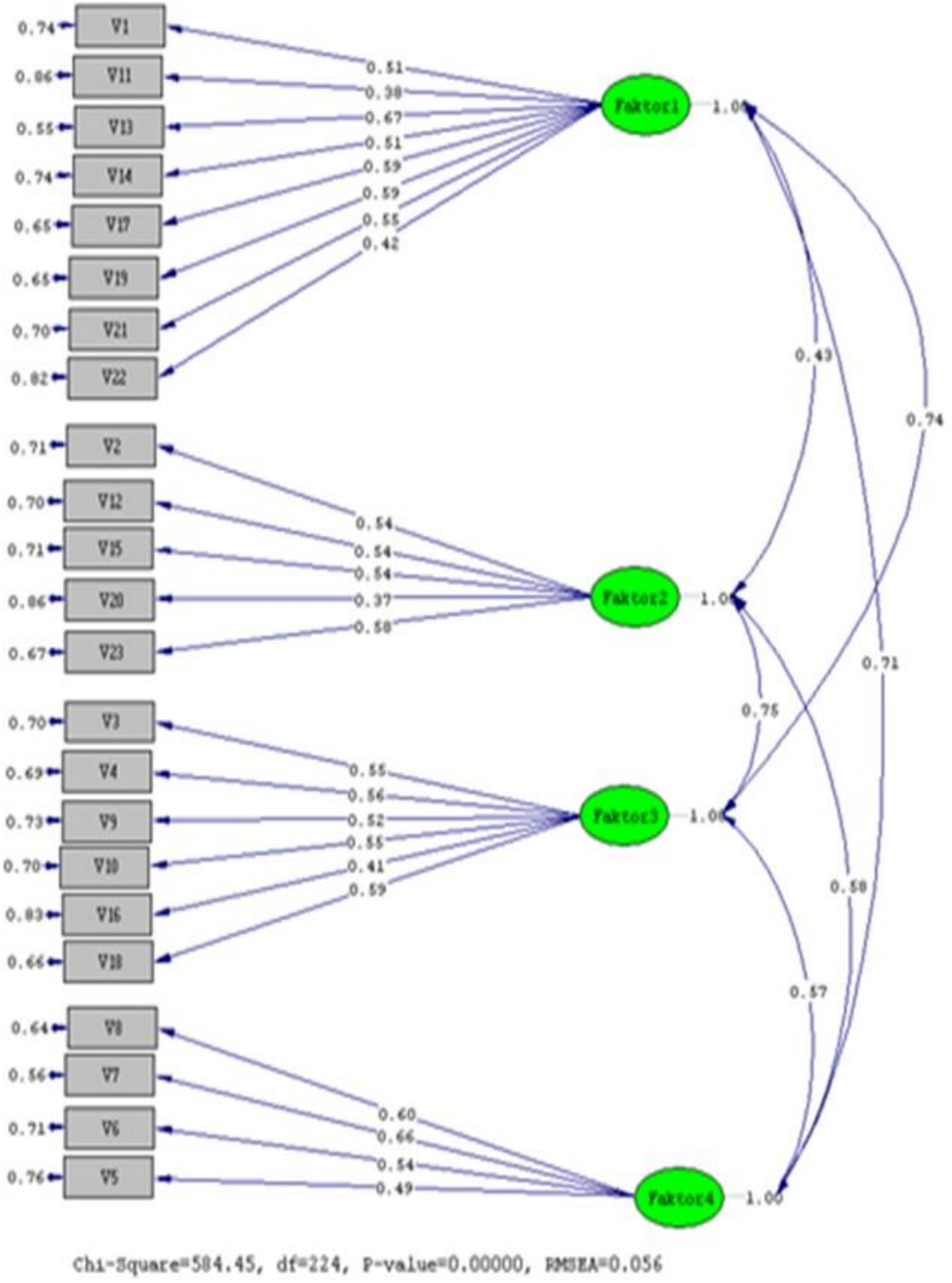

Figure 2. Please add the figure legend

Item Analysis

Item-total correlation and 27 % lower and 27 % upper group comparisons have been made to determine the distinctiveness of the items in the scale. At the end of the analysis, it has been observed that item distinctiveness of all the items are higher than .30. No item has been excluded from the scale in direction of the information that items with item-total correlations .30 and higher can be included in the scale (Geuens & Pelsmacker, 2002). Results obtained are shown in Table 4.

Table 4. Item Analysis Results

Item Number	Corrected item-total correlation	Subgroup		Upper Group		T
		X	S	X	S	
1	.550	3.60	1.18	4.57	.72	8.28
2	.455	3.17	1.23	4.56	.73	11.48
3	.490	3.65	1.14	4.73	.63	9.83
4	.514	3.23	1.23	4.56	.82	10.60
5	.424	4.00	1.19	4.77	.61	6.81
6	.480	3.62	1.17	4.76	.64	10.06
7	.469	3.97	1.12	4.84	.57	8.15
8	.458	3.98	1.04	4.80	.63	7.86
9	.493	3.3	1.0	4.5	.84	10.67
10	.507	2.8	1.2	4.4	.87	12.47
11	.414	3.3	1.2	4.3	1.0	6.69
12	.371	2.7	1.2	4.3	1.1	11.12
13	.555	3.63	1.1	4.5	.78	8.086
14	.470	3.33	1.3	4.3	.94	7.356
15	.505	2.83	1.3	4.1	1.1	8.689
16	.372	3.58	1.1	4.5	.93	7.924
17	.516	3.60	1.1	4.5	.85	7.574
18	.550	3.09	1.0	4.6	.68	14.39
19	.643	3.22	1.4	4.6	.96	9.675
20	.390	3.15	1.1	4.1	1.1	7.527
21	.490	3.67	1.23	4.52	.83	6.816
22	.418	2.85	1.25	3.80	1.18	6.527
23	.440	3.17	1.26	4.62	.96	10.826

As it is seen in Table 4, results regarding the adjusted item-total correlation range from .37 to .64. When it is taken into consideration that items with .30 and higher value are accepted sufficient in distinction of the feature to be distinct in the evaluation of the item-total correlation, then it can be said that item-total correlations are sufficient (Geuens & Pelsmacker, 2002). In 27 % lower and 27 % upper group comparisons about the scale t test has been used. As it can be seen in Table 11, t values regarding the item score differences between the 27% lower and %27 upper groups range from 6.52 ($p<.001$) to 14.39 ($p<.001$). Moreover, Pearson Moment Multiplication Correlation analysis has been made between the factors of the affective dispositions toward environment scale and the results have been presented in the Table 5.

According the results of analysis in the Table 5, there is a statistically meaningful relationship at low level in a positive way between the factor 1 and 2, a relationship in a positive way at medium level among all of the subdimensions and a relationship at high level between the subdimensions and the scale.

Table 5. Pearson's correlation coefficients between factors

Factors		Factor 1	Factor 2	Factor 3	Factor 4	General
Factor 1	r		.268	.521	.476	.745
	p		.000	.000	.000	.000
Factor 2	r			.463	.303	.726
	p			.000	.000	.000
Factor 3	r				.358	.785
	p				.000	.000
Factor 4	r					.703
	p					.000

Reliability

Cronbach Alpha value (Bagner, Storch & Roberti, 2004) which is the mostly applied method has been calculated in order to determine the reliability of the scale in the research. In this context, whereas the Cronbach Alpha value has been calculated as 0.84 for all of the scale, it has been calculated as 0.77 for the first factor, 0.62 for the second factor, 0.66 for the third factor and 0.65 for the fourth factor.

Discussion and Conclusion

One of the most important components of Environmental literacy is the aspect of affective dispositions. This aspect is one of those having a significant importance to observe positive environmental behaviors (Hollweg, Taylor, Bybee, Marcinkowski, McBeth, & Zoido, 2011). Teacher play a crucial role in raising individuals who have environmental literacy. Therefore, it should be aimed to help teachers and pre-service teachers improve this ability (World Commission on the Environment and Development, 1987). With this regard, in this study, it was aimed to adapt a scale which is for active evaluation of affective dispositions of Science pre-service teachers. This study includes the adaptation of environmental affective disposition scale prepared by Yavetz, Goldman and Pe'er (2009), and the findings of the study of validity and reliability.

In the scale adaptation step, firstly the equivalance of the Turkish form of the scale has been successed. For this, the correlation between the Turkish and English form scores of the scale has been calculated. According to the data obtained there is a highly meaningful relationship between two form scores (r=.954, p=.000). After the translation process, exploratory factor analysis (AFA) and confirmatory factor analysisi (CFA) have been made in order to analyse the structure validity of the scale. Internal consistency reliability (Cronbach Alpha) has been calculated in order to calculate the reliability of the scale. Moreover, item analysis has been made in order to determine the regression and distinctiveness of the total score by each item in the scale.

It is observed in the analysis of the data obtained at the end of the exploratory factor analysis that the scale has a five-factor structure, but factor loads disperse on more than one factor and variance percentages of the factors are close to each other. For this reason, the factor structure of the scale has been decreased to 4

and extracting has been made again through the principal components analysis and varimax technique. the first factor *(intention for the action)* of the affective dispositions toward environment scale with four factor explains the 13.510% of the total variance, the second factor *(sensitivity)* 10.619% ; the third factor *(prevention of the damage to the environment)* 10.002% and the fourth factor *(personal responsibility)* 9.546% of the total variance. Total variance explained by the four factors is 43%. Load value of each item has been paid attention to be .40 and higher than it.

After the exploratory factor analysis, confirmatory factor analysis which is based on the structural equality model to test the four-factor structure of the affective dispositions toward environment scale has been made. In the context of related literature, fit indices have been analysed according to the acceptable values of mostly used fit indices (Jöreskog a& Sörbom, 2001; Mcdonald & Moon-Ho, 2002; Tabachnick & Fidel, 2001) and it has been observed that minimum chi square value ($\chi 2$ = 584.45, n = 521 p = .00) is meaningful. Fit indices values have been calculated as RMSEA = 0.056, SRMR = 0.059, RMR = 0.073, GFI = 0.91, AGFI = 0.89, CFI = 0.94. These fit index values show the suitability of the model.

In the following step, it has been determined at the end of the item analyses that have been made in order to measure the item distinctiveness and regression degree of the scale, that corrected item total correlations range from .37 to .64. Correlation analysis both between the subdimensions of the scales and between the subdimensions and the scale has been made in order to determine the relation between the subdimensions of the scale. There is a statistically meaningful relationship in a positive way in the results obtained. Lastly, it has been observed in the Cronbach alpha calculations made in order to determine internal consistency of the affective dispositions toward environment scale that the scale in itself (Cr α= .84) and its subdimensions (Cr $\alpha_{\text{intention for the action}}$= 0.77; Cr $\alpha_{\text{sensitivity}}$=.62; Cr $\alpha_{\text{prevention of the damage to the environment}}$=.66; Cr $\alpha_{\text{personal responsibility}}$=.65) have the sufficient reliability.

Consequently, when the importance of the affective dispositions toward environment are taken into consideration, it is highly important to develop or adapt scales for the measurement of these features, and to measure these fatures correctly. In this study, Turkish adaptation of the affective dispositions toward environment scale, which is asserted to be related to the education, has been made. The original scale has been prepared as 5-point Likert type (1) I strongly agree, (2) I disagree, (3) I am not sure, (4) I agree, (5) I strongly agree and it comprises 5 dimensions and 23 items; whereas the Turkish translation of the scale is composed of 23 items; but the number of factors decreases to 4. In the original scale, there are 5 aspects including the importance of environmental instruction in educational system, priorities for the policy of management of national sources, the use of legislation for environmental issues, self-control and care for the environment. The one adapted into Turkish, on the other hand, consists of 4 factors. These are "intention to take action, sensitivity, stopping the harm to the environment and personal responsibilities." It is not surprising to see that there are 4 factors in the Turkish version of the scale, which is different from the original form, because it is inevitable to obtain a different structure when the cultural differences, diversity in educational system or the school context are considered (Richardson, 1994). In addition, in the process of the determination of the factors of the original scale, that just the theoretical structure was considered

to prepare causes deteoriation of the Turkish version of the scale (Peer, Goldman &Yavetz, 2007). When the related literature is analyzed, it is seen that during the translation of the test and inventories from one language into another one, it is not certain that the scale translated and the scale in the main language will be equal and the scale translated into another language can show differences generally from the main version. The aim is to make these differences be acceptable in sense of semantic psychometric language and psychological feature (Hambleton & De Jong, 2003; Sireci & Berberoğlu, 2000). Getting of the general structure of the scale translated into Turkish through the confirmatory factor analysis shows that the model suggested for the scale is valid. When the factors of environmental affective dispositions are considered, 8 items related to the first factor are to measure the pre-service teachers' intention to take action aspect. Intention is related to affective component of attitude (Fishbein & Ajzen, 1975, p.289). Intention to make, on the other hand, reveals the relationship between the general behavioral intention and the process of decision making (Hadjichambis, 2015). With this regard, intention aspect available in environmental literacy is defined as the state of verbal decision making about their actions towards the environment. That aspect of intention to take action is one which has especially been added by Hines et al. (1986/1987) to components of environmental literacy with his modelling study. In the following periods, this aspect was also used in the environmental literacy model by Hungerford and Volk (1980). This ability is one of the factors enabling positive attitudes towards environmental issues. Studies have revealed that individuals who have high intention to take action are more likely to have positive environmental attitudes more frequently than others (Bogner & Wiseman, 1997; Cottrell & Graefe, 1997). The second factor aims to analyze the sensitivity of the teachers and pre-service teachers towards the environmental issues. When the research on sensitivity factor is considered, it is seen that the individuals who have high environmental sensitivity are more likely to display more responsible behaviors towards the environmental issues. With this regard, the environmental sensitivity factor is emphasized to be one of the main factors contributing to the prediction of responsible behaviors towards the environmental issues (Hungerford & Volk, 1990). According to the results of analysis, third factor in the third scale investigates the individuals' dispositions about the protection of the environmental damage, and in this context, it consists of 6 items. The statements such as "The environmental issues should have a priority in the national level when contrasted to the other issues" or "Damage to the environment may be decreased with the practice of law" are the items supporting this factor. Finally, the fourth factor named personal responsibilities consists of four items. The aim of this factor which is related to meta-cognitive processes is to investigate to what extent the individuals make use of their abilities to decrease the negative behaviors damaging the environment.

Based upon these explanations, the adaptation study of the affective dispositions scale may be said to have been finished. In this study, the affective dispositions scale was adapted in the level for the teachers and pre-service teachers. With other similar studies on broad and diverse samples, more data may be gathered about the students' environmental affective dispositions, and with possible comparisons, the validity and reliability of this scale may be supported.

Disclosure statement

No potential conflict of interest was reported by the authors.

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